

The Seniority-Skepticism Paradox: AI Adoption and Perceptions Among Medical Students in a Resource-Limited Setting

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Abstract

Background: The emergence of Generative Artificial Intelligence (GenAI) has a significant potential effect on medical education though there is little evidence regarding its use, perceptions, and expectations of medical students in resource-limited clinical training contexts.

Objectives: We aim to explore the experiences and perceptions of medical students regarding the use of GenAI technologies in clinical education with a special focus on the AI trust relationship between advanced age and academic level.

Methods: A cross-sectional observational study was conducted over eight months at Al-Kindy College of Medicine, University of Baghdad, Iraq. All clinical-grade students who responded to a 24-item survey were involved (n=423). Multiple linear regression models and descriptive data analysis were performed.

Results: Almost all our sample students reported a current AI use and most of them showed a prior use (n=405,95.7%). Exam preparation (n=316,74.7%) and clinical case generation (n=249,58.9%) were the main use purposes. They exhibited strong agreement regarding AI's ability of better learning potential and essential need for regulatory policies, while marked neutrality appeared toward AI's clinical diagnostic accuracy and long-term practical effects. Significant skepticism (p<0.001) resulted as AI trust positively correlated with higher clinical experience and negatively related to chronological age.

Conclusions: Academic AI adoption was very largely encountered by medical students of resource-limited settings and professional caution was shown regarding broader clinical applications with demands of AI compliance standards. The higher educational grade the better AI trust, while this was inversed regarding student's age displaying a distinct skepticism.

Keywords: AI Literacy; Artificial Intelligence; ChatGPT; Educational Technology; Google Gemini; Iraq; Undergraduate Medical Students.

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INTRODUCTION

Medical education approach is dramatically changed by the fast global rise of Artificial Intelligence (AI)¹. Many new technologies as Generative AI (GenAI) models like ChatGPT and Google Gemini make a novel shift in healthcare management including diagnosis, treatment, learning parameters, and educational aspects. The application of Natural Language Processing (NLP) in GenAI showed manifest human-like interactions and dynamic communications unlike the previous old models of computer-assisted teaching using frozen data. Such characteristics appear more efficient in the simulation of complex clinical case scenarios with more potential for critical systematized thinking which will eventually improve learning abilities among medical students.^{2,3}

We have been introduced to AI tools since late 2022, but it is not exactly known when it is formally integrated into healthcare field.⁴ Some medical schools updated their curriculum and incorporated AI technologies in many ways like digital anatomy and AI-driven simulations, but the full view of student's perceptions and feed-back is still not well studied⁵. This issue should be addressed and improved as the daily use of AI in medical education has many confounders including student trust and how to deal with AI-generated results, and we should not forget ethical issues which master the relationship between the student and AI adoption. Many concerns appeared regarding AI use led to a tentative academic atmosphere not limited to data privacy and hallucinations, and probable effect of AI on the basic academic skills.⁶⁻⁹

Iraq is a good example of a resource-limited medical and educational setting, and up to our knowledge there is no published data investigated the overall AI adoption rate among medical students with their current attitudinal perceptions, future expectations and suggestions to upgrade the local medical education system. The observations of this work could provide a panoramic view of the present situation in resource-limited areas throughout the world trying to optimize the AI integration into appropriate medical learning system.¹⁰⁻¹³

AIMS OF THE STUDY

We aimed to find out the existing circumstances regarding AI adoption for medical education in Iraq by medical students in their medical training academic

years, and attitudinal AI perceptions. Also, the effect of progressive escalation of academic grade and age of medical students on their level of trust in AI outcomes.

METHODS

A cross-sectional, descriptive, and quantitative study was implemented among medical students having medical practice training in the teaching hospital during the 2025-2026 academic year of Al-Kindy College of Medicine, University of Baghdad, which is the largest university in the country. Those students were in grades 4,5, and 6 and they were supposed to use AI during daily medical learning process.

A convenience sampling technique was employed for recruitment.

We reviewed most of recent published articles related to our subject and tried to build an appropriate questionnaire serving our aims. After that, a panel of experts in medical education consisted of three professors reviewed that questionnaire and we updated it based on their suggestions resulting in a 24-item survey ready to be used for our research. We also tested the reliability of the Likert-scale items that measured AI perceptions in the involved students; the calculated Cronbach's alpha was^{0.82}, indicating a high internal consistency. The survey was distributed online through academic social platforms where all the target students attend. Face-to-face interviews were complemented to ensure data quality and confirm the responses. This questionnaire (survey) was divided into four major parts, the first is socio-demographic characteristics including age, gender, geographic location (governorate), and current academic grade. The second part is educational integration including digital anatomy tables, virtual dissection, and computational pathology. The third part is AI usage patterns including the frequency and specific applications of current AI tools like ChatGPT and Google Gemini for real tasks like exam preparation, case scenario generation, and research support. The last domain is perceptions and attitudes including Likert-scale items to measure student trust, ethical worries, and future expectations regarding AI in clinical education and practice.

Statistical analyses were completed using IBM SPSS Statistics for Windows, Version 29.0 (Armonk, NY: IBM Corp). Frequencies and percentages were calculated for categorical variables and a multi-response analysis was applied to disaggregate data and

measure the prevalence of each variable with multiple selections. A standard 5-point Likert scale was applied to measure students' perceptions and attitudes ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Instead of analyzing questions about trust and reliability separately, we combined these data to create a single, continuous Composite AI Trust Score for each involved student. After confirming that the data was normally distributed using the Shapiro-Wilk test and visual checks of Q-Q plots, a multiple linear regression analysis was performed in order to determine whether a student's chronological age and academic grade level could predict their level of AI trust. The coefficient factor of determination (R^2) was used to assess model fit, and a p-value of < 0.05 was considered as the limit for statistical significance for all analysis process.

RESULTS

The total number of recruited students was 423 where males slightly higher than females (50.1% vs 49.9%). The most frequent age group was 22 years - < 23 years accounting for 58.6%, n=248. Baghdad was the major residence (n=374, 88.4%), and about half of participants were from 4th academic grade (n=214, 50.4%). All these data was shown in table 1.

Table 1. Demographics

Question	Response	Count	%
Gender	Male	212	50.1
	Female	211	49.9
Age Range	22 - less than 23 years	248	58.6
	23 - less than 24 years	100	23.6
	24 years - and above	75	17.7
Governorate	Baghdad	374	88.4
	Others	49	11.6
Grade Level	4th Grade	214	50.6
	5th Grade	104	24.8
	6th Grade	105	24.6

Table 2 shows recent AI exposure of the involved students to educational processes where 274 (64.8%) of them used digital anatomy approach, and surprisingly 95%, n=405 had already used AI tools especially for study or exam preparation (n=316, 74.7%).

Table 2. Current AI Experience & Education

Question	Response	Count	%
Which advanced technologies were formally incorporated into your medical school curriculum?	Digital Anatomy (e.g., Anatomy tables)	274	64.8
	AI Generated Case Simulations	208	49.2
	Virtual Dissection	158	37.4
	Computational Pathology	107	25.3
	None of the above	63	14.9
Have you used AI tools (like ChatGPT, Google Gemini) during medical school?	Yes	405	95.7
	No	18	4.3
For which tasks have you used AI tools?	Study or exam preparation	316	74.7
	Generate case scenarios for learning	249	58.9
	Generate questions to test myself	242	57.2
	Complete written assignments / essays	209	49.4
	Suggest research topics or questions	157	37.1
	Write case reports / Research papers	185	43.7

Regarding future expectations of medical students' AI use in table 3, more than half of them (n=276, 65.2%) intended to use such tools during future career especially for writing research papers / case reports, answering medical questions, studying or exam preparation and exploring new medical topics or research n=294 (69.5%), 285 (67.4%), 274 (64.8%), and 255 (60.3%), respectively. On the other side, a clear discrepancy was observed regarding clinical decision making as only (21%, n=89) of them responded positively to this point. This may indicate some sort of hesitancy towards the rely on AI tools in professional judgement.

Table 3. Future Expectations

Question	Response	Count	%
Do you plan to use AI tools during your residency or future practice?	Yes	276	65.2
	Unsure	121	28.6
	No	23	5.4
For which tasks do you anticipate using AI tools in the future?	Answer medical questions	285	67.4
	Study or exam preparation (e.g., Board exams)	274	64.8
	Explore new medical topics or research	255	60.3
	Write research papers / Case reports	294	69.5
	Assist in clinical decision-making	89	21.0

Figure 1 illustrates the distribution of student perceptions regarding AI, showing a clear separation between educational encouragement and professional neutrality. The highest consensus in agreement (blue) was observed in AI's capacity to improve ability to learn (166 responses, 39.2%) and the obligation need for medical schools to develop AI policies (163 responses, 38.5%).

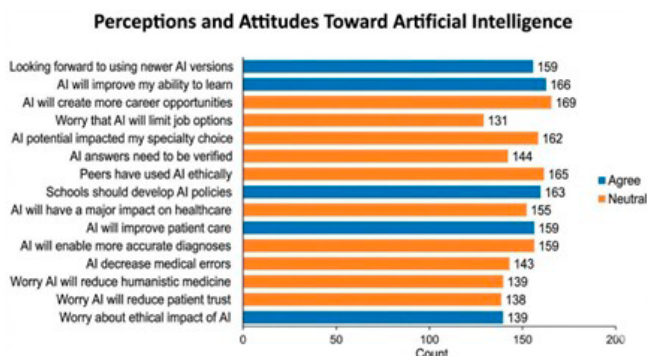


Figure 1. Distribution of the most frequent Likert-scale responses for students' perceptions and attitudes toward AI

In contrast, responses directed predominantly toward neutrality (orange) regarding AI's broader professional and clinical impacts. The highest neutral responses were reported for AI's presumed potential to create more career opportunities (169 responses, 40.0%), ethical use of AI by peers (165 responses, 39.0%), the influence on specialty choice in the future (162 responses, 38.3%), and its ability to enable more accurate diagnoses (159 responses, 37.6%). Interestingly, while 139 students (32.9%) agreed that they worry about the

ethical impact of AI, other critical concerns like AI reducing humanistic medicine (139 responses, 32.9%) and reducing patient trust (138 responses, 32.6%) were largely appeared with neutral responses, indicating a general sense of uncertainty regarding AI's long-term socio-clinical outcomes.

The multiple linear regression analysis expressed in figure 2, revealed that academic seniority was a highly significant predictor of AI trust scores ($p < 0.001$). For every one-year increase in academic grade level, the predicted trust score decreased by 0.17 points on the Likert scale. This clear inverse correlation suggests that increased clinical exposure correlates with elevated skepticism regarding AI-generated results. In contrast, age was not found to be a statistically significant predictor of AI trust ($p = 0.128$), indicating that the shift in perception is caused by academic medical training rather than biological age.

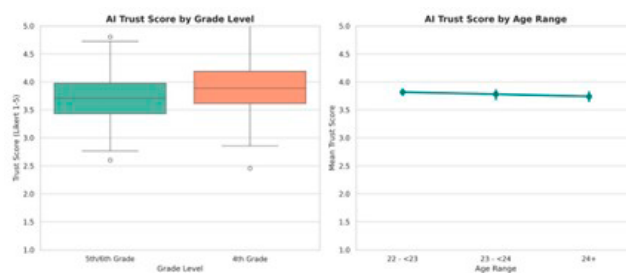


Figure 2. AI trust score by grade level and age

DISCUSSION

We observed a noticeably a high utilization rate of different AI platforms including Google Gemini and ChatGPT among medical students (95.7%) which may suggest that AI tools have been popularly used and not limited to entertainment issues but extended to medical educational aspects within our resource-limited learning contexts. However, our finding was higher than other nearby areas and even developed countries. In Saudi Arabia¹¹ and Egypt¹⁴ as examples of neighboring countries, GenAI utilization rates were 74.9% and 76.4%, respectively, while published rates in Europe¹⁵ and the United States¹⁶ as examples of developed nations were 38.8% and 62.9%, respectively. We think that our elevated rates of GenAI use among medical students could reflect their passion to get a dependable source of medical information that supports their learning process to overcome resource-restricted environment.

Although our findings revealed a high interest in learning, they showed also a cautious clinical perception. About two thirds of our involved students (74.7%) used AI for exam preparation (74.7%) and (58.9%) for clinical case scenario generation, and we consider these high rates are in line with the recent increasing trends of introducing AI tools in clinical education.¹⁷⁻¹⁹

Our finding of a near consensus regarding AI use to improve learning capabilities just like other previously published data²⁰, did not lead to a real confidence of AI tools and most our students were neutral about accurate diagnosis, decreasing medical mistakes, and impacts on career opportunities and specialty types. Human medical decision is the main factor of clinical practice and our students distinguished such professional limits in clinical education.²¹

The most important observation in this study based on our view point is the surprisingly inverse relationship between the academic grade level and student's trust in AI tools. The increase in clinical seniority (academic grade) of medical students leads to a significant decrease in their AI trust. This paradox of seniority skepticism may indicate a healthy transition from the basic knowledge in its theoretical pattern offered to medical students in earlier academic grades in classroom settings into clinical practice in the hospital wards during the later academic grades. In other words, the self-felt confidence supported by theory alone is replaced by the awareness of patient's clinical care, and this is a good indicator of improvement in medical education process and this makes the students remain skeptical and keep a state of non assurance toward AI-related clinical information, confirming our finding where clinical maturity improves critical appraisal ability^{22,23}, but a recent Egyptian cross-sectional survey found that age was the sole independent predictor of AI perception¹². The involved sample in this Egyptian survey included not only medical students but also postgraduate practitioners and the age ranges were much higher than our sample which was only confined to medical students in their clinical years with narrow age ranges, so that chronological age have been excluded as a significant differentiating element, leaving the level of clinical exposure expressed by academic grade as the most significant factor of AI skepticism.

Even though many students in our group said they use AI often, they still showed a pretty good sense of right and wrong when it came to ethics. A lot of them did express concerns about how AI might affect things like patient trust or the human side of medicine, but

when you look closely at their answers, most of them actually felt neutral about those specific issues. However, there was an essential agreement among involved students about the demand of medical colleges to develop and enforce AI policies. This demand indicates that students correctly realize and identify the unreliability of current AI use²⁴. The absence of formal protocol of AI adoption in resource-limited environments leaves students struggling ethical guidelines and professional standards independently with no robust protective mechanisms. Therefore, it is vital for medical colleges and health institutions to urgently address the issue of AI literacy and build critical evaluation frameworks and infuse them throughout the formal educational medical curriculum to ensure active future integration.²⁵

LIMITATIONS OF THE STUDY

Although this work presents critical view of GenAI integration within a resource-limited medical education setting, there are some limitations that should be identified. The cross-sectional design of the study limits the spotlighted association of the seniority-skepticism paradox as no longitudinal causality could be confirmed over time. Also, the single-involved setting (AI-Kindy College of Medicine, University of Baghdad) restricts the credibility of our findings and reflects the need of generalizability to other Iraqi medical colleges or even other parts of the world under resource-scarce conditions. However, this single center cohort could be considered as a foundational pilot study for more generalized studies at the national and international levels.

Additionally, the self-reported survey introduces the potential for response bias. Either over- or underestimated responses could be resulted. This may be caused social desirability (as AI adoption becomes a social trend) or academic controversy and debates about scholastic integrity of AI use.

Finally, since the unprecedented development of AI platforms leads to continuous dynamic shift regarding the concepts surrounding AI adoption, our observations should be regarded as an initial reference point, highlighting the importance of further multi-center, longitudinal cohorts to adaptively track these rapidly evolving AI educational parameters.

CONCLUSION

The adoption of GenAI among involved medical students in resource-limited settings is highly prevalent. It

is mainly used as an academic adjunct assistant rather than a definitive clinical tool. This study emphasized the finding of seniority-skepticism paradox, showing that as students moved from theoretical basic learning to practical clinical work, their trust in AI significantly diminishes reflecting a favorable professional restraint. Also, the students revealed a strong educational optimistic approach, but they were neutral regarding AI's diagnostic accuracy and long-term ethical viewpoints. The stressed student demand for institutional AI protocols signals an urgent need for medical colleges and educational venues to develop formal AI safe guidelines and effective policies.

Ethics Statement and Conflict of Interest Disclosures

Financial support and sponsorship: All authors have declared that no financial support was received from any organization for the submitted work.

Ethics Consideration: The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national laws. Written informed consent was provided by all the patients participants in this study. This study was approved by the Institutional Research Board and Ethics Committee.

Conflict of interest: No known conflict of interest correlated with this publication.

Availability of data and materials: The data used and/or analyzed throughout this study are available from the corresponding authors upon reasonable request.

Competing interests: The authors declared that they have no competing interests.

The use of generative AI and AI-assisted technologies: The authors did not use in this article generative AI and AI-assisted technologies.

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